

REMARKS

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, the independent claims being considered on the merits in the above-identified application, that is, claims 11 - 14, 27 and 30, have been amended to recite that in moving the other end of the first surface plate and bending it into an arc-shape, the first surface plate is separated at the other end from "both" the core material and the second surface plate.

Furthermore, applicants are adding new claims 32 - 34 to the application. Claims 32 and 33, dependent respectively on claims 12 and 32, respectively recites that the second surface plate extends beyond the first surface plate at the other end of the first surface plate; and recites that the second surface plate extends beyond the first surface plate such that after moving and bending the other end of the core material and the second surface plate, the other ends of the first and second surface plates are in substantially a same plane. Claim 34, also dependent on claim 12, recites that the other end of the core material and the second surface plate are moved and bent together along the first surface plate being bent.

In connection with amendments to the previously considered claims, and in connection with the newly added claims, note, for example, Figs. 2 and 4 of applicants' original disclosure, as well as the description on page 7 of applicants' specification.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the prior art applied by the Examiner in rejecting claims in the Office Action mailed June 2, 2004, that is, the teachings of the U.S. patents to Palfey, et al, No. 4,078,959, to

Banks, et al, No. 6,036,802, and to Koss, et al, No. 4,853,018, and Japanese Patent Document No. 9-295050 (Toshinori), under the provisions of 35 USC 103.

It is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a method of bending a laminated material including, inter alia, while fixing one end of first and second surface plates of the laminated structure, moving the other end of the first surface plate and bending it into an arc-shape, thereby separating the first surface plate at the other end from both the core material and the second surface plate; and moving and bending the other end of the core material and the second surface plate along the first surface plate being bent, and adhering the core material to the first surface plate. Note each of claims 11 - 14, 27 and 30.

Furthermore, it is respectfully submitted that these references would have neither disclosed nor would have suggested such method of bending a laminated material as discussed in the foregoing, and, moreover, wherein an adhesive is applied to either one of the contact surfaces between the first surface plate and the core material at the other end of the first surface plate after moving the other end of the first surface plate and bending it into an arc-shape. See claim 11.

Additionally, it is respectfully submitted that these references would have neither taught nor would have suggested such a method of bending a laminated material, having processing features as discussed previously in connection with all of claims 11 - 14, 27 and 30, and, furthermore, wherein in moving and bending the other end of the core material and the second surface plate along the first surface plate being bent, the first surface plate side portion of the core material is crushed in the direction of the bend. See claim 13, note also claim 14; additionally, it is

respectfully submitted that these references would have neither disclosed nor would have suggested such a method, and wherein a foam member fills the plurality of cells of the core material in the direction of the bend, as in claim 14.

Furthermore, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such a method of bending a laminated material as in the present claims, having features as discussed previously with respect to all of claims 11 - 14, 27 and 30, and, additionally, wherein an adhesive is applied by spraying to either one of the contact surfaces between the first surface plate and the core material at the other end of the first surface plate, and wherein the bending of the first surface plate is performed by sucking the other end of the first surface plate by an arc-shaped second base positioned at the other end of the first surface plate, and, after fixing the other end of the first surface plate to the second base, rotating the second base on the other end of the first surface plate so that the other end of the first surface plate is moved toward the direction separating from the core material (note claims 27 and 30); in particular, wherein the bending of the core material and the second surface plate is performed by moving a roller from the one end of the second surface plate toward the other end thereof, and, at the same time, moving the roller toward the first surface plate (see claim 30).

Moreover, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested the other features of the present invention as in the remaining, dependent claims, including (but not limited to) the bending of the core material and second surface plate as in claim 9; and/or wherein the one end of the first surface plate is fixed to the at least

one base during the bending of the first surface plate, as set forth in claim 10; and/or providing of the adhesive as set forth in claim 28, particularly wherein an area of the surface of the first surface plate which is bent when performing the moving and bending the other end of the first surface plate is not provided with adhesive (see claim 29); and/or wherein the second surface plate extends beyond the first surface plate at the other end of the first surface plate (see claim 32), especially the extent to which the second surface plate extends beyond the first surface plate as in claim 33; and/or wherein the other end of the core material and the second surface plate are moved and bent together, along the first surface plate being bent (see claim 34).

The present invention is directed to a method of bending a laminated material, which can be utilized to provide a laminated material having a relatively large thickness and having a curved surface with relatively small radius. In particular, the present invention is directed to a method of bending a laminated material, in which both inner and outer surface plates are bent to have an arc-shape, with a good appearance of the laminated material (e.g., a relatively smooth arc-shape at the surface plates), the method being relatively simple.

Various techniques for forming a small bend radius of specified laminated material have previously been proposed, as described on pages 1 and 2 of applicants' specification. However, these techniques are deficient in providing a curved laminate with appropriate bending, by a simplified process. These techniques are also deficient in providing a good appearance for the bent arc-shaped structure, by a simplified process.

Applicants achieve objectives of providing a bent laminate having a good appearance, with such bent laminated material being provided by a simplified

process. According to the present invention, a bent laminate can easily be manufactured, with the character of the arc of the bent laminate depending on how the first surface plate is bent, since the remainder of the laminated material is bent to match the bend that is put into the first surface plate. According to the present invention, in performing the bending, both the first surface plate and the second surface plate provide the convex surface during the respective bending procedures; and it is respectfully submitted that according to the present invention good appearances of the laminated structure can be achieved, after bending to the arc-shape.

Palfey, et al. discloses a method for the preparation of a foamed cored sandwich panel having a curved portion therein, the steps including affixing a first or inner facing sheet to a flexibilized foam plastic core; affixing a second or exterior facing sheet to the foam plastic core in a region where it is not desired to bend the resultant panel; bending the core and first facing sheet to a desired configuration wherein the first facing sheet is disposed on the concave side of the bend; and adhering any unadhered portion of the second facing sheet to the core in the bent region of the laminated panel. See column 1, lines 45-57. Note also column 2, lines 4-8, describing suitable skin or facing sheets for the panel. This patent discloses that the described method requires relatively small quantities of labor and equipment, and avoids destruction of the core material. See column 1, lines 23 - 29.

It is emphasized that this patent discloses a method wherein, initially, both the first or inner facing sheet and the flexibilized foam plastic core are bent, the second facing sheet thereafter being bent. It is respectfully submitted that the disclosure in

Palfey, et al. would have neither taught nor would have suggested, and in fact would have taught away from, the presently claimed subject matter, including wherein the other end of the first surface plate is moved and bent toward the direction separating from the core material, thereby separating the first surface plate at the other end from both the core material and the second surface plate.

As can be appreciated, by initially bending only the first surface plate, an accurate and precise bending thereof can be achieved, with the core and second surface plate layer being bent to follow the curve of the first surface plate. It is respectfully submitted that the disclosure of Palfey, et al., wherein both a surface sheet and the flexibilized foam plastic core are initially bent, would have neither disclosed nor would have suggested the presently claimed subject matter wherein the first surface plate is moved and bent to thereby separate the first surface plate at the other end from both the core material and the second surface plate, and advantages thereof in providing a precise curved plate due to, for example, only bending such first surface plate at the first instance.

It is respectfully submitted that with a method such as in Palfey, et al, wherein both an inner facing sheet and a core material are bent toward the inner facing sheet, it is very difficult to bend the laminated panel to have a good appearance, because unevenness occurs on the surface of the bent portion and an appearance thereof becomes bad, due to the fact that it is necessary that the inner surface plate essentially shrinks in length. In contrast, according to the present invention, wherein the inner and outer surface plates are separately bent, the outer surface plate being bent together with the core material, wherein each of the first and second surface plates provide the convex surfaces in the respective bending procedures, a good

appearance is achieved, in a relatively simplified process with an accurate and precise bending being achieved.

The contention by the Examiner that Palfey, et al "teaches the formation of a smooth bent surface by bending the desired smooth surface without any materials attached to it in the bending region and then attaching the other materials" is respectfully traversed. The Examiner is respectfully requested to point out the specific portions of Palfey, et al describing achievement of formation of a smooth bent surface by bending the desired smooth surface without any materials attached to it. It is emphasized that Palfey, et al is concerned with avoiding destruction of the core or other damage to the core, and it is respectfully submitted that this reference would not have disclosed nor would have suggested, the formation of a smooth bent surface by bending the desired smooth surface without any material attached to it in the bending region.

The additional contention by the Examiner on page 2 of the Office Action mailed June 2, 2004, that one reading Palfey, et al as a whole would appreciate that the method of Palfey, et al could be used to form a smooth inner panel instead of a smooth outer panel by bending the inner panel alone rather than both the inner panel and the core and then bending the core and outer panel rather than the outer panel alone, is respectfully traversed. It is respectfully submitted that Palfey, et al is not concerned with smooth curved laminate panels; in this regard, the Examiner is respectfully challenged to point out where Palfey, et al even mentions "smooth" curved laminate panels. As emphasized in the foregoing, it is respectfully submitted that Palfey, et al is concerned with avoiding destruction of the foam core, and would have neither disclosed nor would have suggested the presently claimed method,

including portions of the laminate bent together, and advantages thereof as in the present invention.

The Examiner contends in the paragraph bridging pages 2 and 3 of the Office Action mailed June 2, 2004, that Palfey, et al teaches the formation of a smooth bent surface by bending the desired smooth surface without any materials attached to it in the bending region and then attaching the other materials. It is respectfully submitted that Palfey, et al provides no such disclosure. Rather, it is respectfully submitted that Palfey, et al discloses formation of structure wherein the inner surface plate and foamed core structure are initially bent together, with the outer member of the laminate thereafter being bent by itself in order to avoid destruction or other damage of the core. It is respectfully submitted that Palfey, et al provides no express description, nor any suggestion, with respect to formation of a smooth bent surface as alleged by the Examiner.

It is respectfully submitted that the additional teachings of Banks, et al would not have rectified deficiencies of Palfey, et al, such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Banks, et al discloses a single step process and apparatus for producing smooth and strong bends of any desired radius in thermoplastic skinned honeycomb core panels, wherein a linear band of an inside face sheet is heated on one side of the panel with a heater bar to soften resin in the inside face sheet and eliminate adhesive holding of the inside face sheet to the honeycomb core, the linear band being formed into a bubble separated away from the honeycomb core by lifting the heater bar away from the panel and pulling the inside face sheet away from the core; and bending a distal leg of the panel outboard of the clamped portion around a

heated anvil along an axis parallel to the linear band to form a bend, with the bubble coinciding with the inside of the bend. The bubble is collapsed around the inside radius and formed into an overlapping flap of the inside face sheet, with the overlapping flap of inside face sheet being pressed in a fold between the anvil and the bent leg of the panel and the leg being held in the bent position while resin in the flap freezes or solidifies in the fold. Note column 1, lines 45 - 62. See also Figs. 19 - 22 and the description in connection therewith in columns 10 - 12 of this patent, showing bubble 143 forming bend or flap 340 in Fig. 22.

As can be appreciated, Banks, et al discloses separating the core material and the face sheet material only at the location of the bend. It is respectfully submitted that this reference, either alone or together, with the teachings of Palfey, et al, would have neither disclosed nor would have suggested the presently claimed method, including, inter alia, wherein the first surface plate is separated at the other end from both the core material and the second surface plate, and advantages thereof as discussed previously.

Furthermore, it is respectfully submitted that Banks, et al discloses a technique solely for thermoplastic panel bending, and includes the complicated technique wherein initially total bonding is provided and thereafter, only portions of the panel at the location of the bend are disbonded. This patent expressly discloses formation of a bubble formed at the location of the bend, which forms the unappealing appearance of the flap at the bend. It is respectfully submitted that the combined teachings of Palfey, et al and of Banks, et al would have neither disclosed nor suggested the presently claimed invention, including wherein in moving the other end of the first surface plate and bending it into an arc shape, the first surface plate

at the other end is separated from both the core material and the second surface plate, and advantages thereof.

It is respectfully submitted that the combined teachings of Banks, et al and Palfey, et al, with Banks, et al being the primary reference would have neither taught nor would have suggested the presently claimed subject matter.

Teachings of these two references have been discussed; and, in particular, the flap necessitated in Banks, et al is noted. Particularly in view of the teachings of this reference, it is respectfully submitted that the combined teachings of Banks, et al and of Palfey, et al would have neither disclosed nor would have suggested the specific processing as in the present claims, including bending and moving of the first surface plate, thereby separating such plate at the other end from both the core material and the second surface plate, as in the present invention, and advantages thereof.

The contention by the Examiner in the paragraph bridging pages 3 and 4 of the Office Action mailed June 2, 2004, that Palfey, et al "discloses unbonding and rebonding a face sheet to form an attractive appearance to the panel" is respectfully traversed. Initially, the Examiner is respectfully requested to point out the specific portions of Palfey, et al describing "unbonding" a face sheet, much less "unbonding and rebonding" a face sheet "to form an attractive appearance to the panel", again emphasizing that Palfey et al is primarily concerned with avoiding destruction of the core.

It is respectfully submitted that the additional teachings of Toshinori and Koss, et al would not have rectified the deficiencies of Palfey, et al and Banks, et al (with either one of Palfey, et al and Banks, et al being the primary reference), such that

the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Toshinori discloses a technique to provide an outward bending of a metal core resin plate. The technique is described in the Abstract of Toshinori.

Koss, et al discloses a method and apparatus for forming a glass sheet in a desired shape, while the glass sheet is being transported on a rotating forming surface, the method of this patent being described most generally at column 2, lines 22 - 52. See also column 5, lines 11 - 14 and 41 - 55.

Initially, note that Koss, et al is directed to a technique for shaping a glass sheet (that is, molding a heated glass sheet to a form). It is respectfully submitted that this forming technique in Koss, et al is a different technology than the bending as in, for example, Palfey, et al and Banks, et al, and that Koss, et al addresses different problems than problems addressed in Koss, et al and Banks, et al. Accordingly, it is respectfully submitted that one of ordinary skill in the art concerned with in Palfey, et al and Banks, et al would not have looked to the teachings of Koss, et al. In other words, it is respectfully submitted that Koss, et al is not analogous art with respect to Palfey, et al and Banks, et al.

In any event, it is again noted that Koss, et al is directed to forming a curved glass by shaping the glass on a curved surface. In view thereof, it is respectfully submitted that there would have been no motivation to have applied the teachings of Koss, et al to the teachings of Palfey, et al and of Banks, et al as necessary in a proper rejection under 35 USC 103.

In any event, even assuming, arguendo, that the teaching of Koss, et al and of Toshinori were properly combinable with the teachings of Palfey, et al and Banks,

et al, such combined teachings would have neither disclosed nor suggested the presently claimed method, including moving the other end of the first surface plate and bending it into an arc-shape, thereby separating the first surface plate at the other end from both the core material and the second surface plate, and other features of the present claims as previously discussed.

The contention by the Examiner that Koss, et al discloses using a curved base with a vacuum source to bend a panel is respectfully traversed. It is respectfully submitted that Koss, et al provides a forming (shaping) technique wherein a glass former is used and the glass sheet is shaped or molded to the surface of the glass former. The heating required in Koss, et al is emphasized. It is respectfully submitted that Koss, et al does not disclose, nor would have suggested, even in combination with the teachings of the other applied references, the bending of a panel as in the present invention.

The additional contention by the Examiner at the top of page 6 of the Office Action mailed June 2, 2004, that while Palfey, et al does not specifically disclose using the roller which moves along the inner panel and presses in a direction perpendicular to the inner panel to bend the layers, "one in the art reading the reference as a whole would appreciate that this roller could also be used as the bending device", the Examiner referring to Fig. 17 of Palfey, et al, is noted. It is noted that there is no Fig. 17 in Palfey et al. If the Examiner is referring to roll 17 in Palfey, et al, it is respectfully suggested that this roll 17 (see Fig. 6) rolls along the outer panel, not the inner panel. While an unnumbered roller is shown along the inner panel in Fig. 3 of Palfey, et al, it is respectfully suggested that there is no disclosure of pressing by this roller; and, in fact, it would appear that this roller is

really disclosed as rotating (note the arrow associated with this unnumbered roller in Fig. 3).

Moreover, the test under 35 USC 103 is whether the combined teachings of the references would have disclosed or suggested the claimed subject matter, not whether one in the art "would appreciate" that the roller "could also be used" as the bending device.

In addition, applicants traverse the conclusion by the Examiner, without any evidence in support thereof, that one of ordinary skill in the art would appreciate that the roller could be used as the bending device.

The additional contention by the Examiner on page 5 of the Office Action mailed June 2, 2004, that Koss, et al discloses that it is known to use vacuum to bend a substrate, is respectfully traversed. It is respectfully submitted that Koss, et al discloses a glass former surface, wherein the glass is shaped, with heating, e.g., the glass forming surface acting like a mold surface. It is respectfully submitted that this disclosure in Koss, et al does not disclose nor would have suggested, use of vacuum for bending as in the present invention, and advantages thereof.

The additional contention by the Examiner on page 7 of the Office Action mailed June 2, 2004, that the primary differences between the references is which sheet the core is attached to during the bending operation, the Examiner contending that in Palfey, et al it is attached to the first sheet being bent while applicants' claim it is attached to the second sheet being bent, is noted. It is respectfully submitted that this difference provides a vast different in results achieved, including appearances of the exposed surfaces of the laminate after bending.

The further contentions by the Examiner with respect to Palfey, et al, that this

reference "separates the second sheet so that the second sheet will form a smooth surface when re-attached"; and that Palfey, et al "discloses that it is known to form a smooth inner surface rather than a smooth outer surface", are noted. The Examiner is respectfully requested to point out the specific portions of Palfey, et al, disclosing separation of the second sheet so that the second sheet will form a smooth surface when re-attached; and also point out the specific portion of Palfey, et al disclosing that it is known to form a smooth surface, much less a smooth inner surface rather than a smooth outer surface. As noted previously, it is respectfully submitted that Palfey et al is concerned with avoiding damage and destruction of the core, and a basis by the Examiner for the conclusion that Palfey, et al discloses forming smooth surfaces, much less forming a smooth inner surface rather than a smooth outer surface, is not seen.

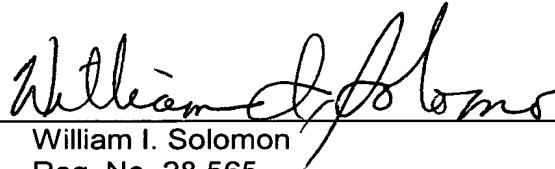
The interpretation by the Examiner of the teachings of Palfey, et al in the paragraph bridging pages 7 and 8 of the Office Action mailed June 2, 2004 is respectfully traversed. It is respectfully submitted that this reading of Palfey, et al by the Examiner is simply overly broad, based upon applicants' teachings, and is clearly improper under the requirements of 35 USC 103. Simply put, it is respectfully submitted that Palfey, et al, in its broadest teachings, discloses affixing a first or inner facing sheet to a flexibilized foam plastic core; affixing a second or exterior facing sheet to the foam plastic core, a region where it is not desired to bend the resultant panel; bending the core and first facing sheet to a desired configuration wherein the first facing sheet is disposed on the concave side of the bend; and adhering any unadhered portion of the second facing sheet to the core in the bent region of the laminated panel. Note column 1, lines 45 - 57 of Palfey, et al.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently being considered on the merits in the above-identified application, are respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 648.40365X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By 

William I. Solomon
Reg. No. 28,565

WIS/jla
Telephone: (703) 312-6600